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an accumulation of figures the interpretation of which would be of both scientific and practical value, being applicable to physiological and horticultural problems alike.

H. Hus

Campbell's Mosses and Ferns.[1]—This new edition of a widely used work is so much enlarged and revised as to deserve recognition as such on its title page, rather than to have it announced only in the "Preface to the Second Edition." The extent of the new matter is shown in the increase of the fourteen chapters constituting the body of the former book, by 54 pages, the addition of two entirely new chapters containing about 29 pages, and the increase of the text figures from 266 to 322. The great activity of investigators in this field during the ten years since the first edition was issued, is indicated by the addition of about 180 titles to the bibliography, while some papers referred to in the new text appear to be omitted from the list.

The portion of the text devoted to the Bryophyta is not greatly modified. The changes consist chiefly in the suppression of a few sentences here and there, and the occasional addition of a paragraph or two; *e. g.*, there is a new account of the spermatogenesis of Marchantia based on Ikeno's work. The most striking change is the elevation of the Anthocerotaceæ from the rank of a subordinate "Group" under the Hepaticæ to that of the Class Anthocerotes coördinate with the Hepaticæ and the Musci. This view is not new, for the same disposition of the group was formally made by Howe in 1899, and was followed by Professor Campbell in his *University Text-book* (1902), though neither in the latter work nor here does the author mention the fact. Little new evidence on this question is now brought forward, for the increase in the space devoted to the Anthocerotes is due chiefly to the addition of three new figures. The change has come about through the giving of greater weight to the well known peculiarities of the group, and it is to be welcomed as emphasizing the importance of these plants in phylogeny. It is a pleasure to note that the author has at last begun to adopt a consistent plan of designating orders and families in accordance with the best present usage, though it is unfortunate that he still clings to the clumsy and anomalous terms Jungermanniales Anacrogynæ and J. Acrogynæ. Incidentally it might be remarked that the author perpetuates an error of the first edition in stating that Underwood, in substituting for the above terms the names Metzgeriaceæ and Jungermanniaceæ, regarded these families as divisions coördinate with the Marchantiales and Anthocerotes; the latter writer in fact, considered the whole group of the Jungermanniales as of equal rank with the Marchantiales.

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[1] Campbell, D. H. *The Structure and Development of Mosses and Ferns* (*Archegoniatæ*). New York, The Macmillan Co., 1905. 8vo, vii + 657 pp., illus.

In the portion devoted to the Pteridophyta, there is not such a consistent use of the proper ordinal terminations, and the lack of indication as to the rank of the different groups in the main headings will cause much unnecessary trouble for the student who wishes to get a general view of their relative position in classification. The most important change in this section is the removal of the Isoetaceæ from the eusporangiate ferns to a position after Selaginella. There will doubtless be general acceptance of the view that this group is sufficiently distinct to warrant the establishment of a separate order Isoetales; perhaps it might better be regarded as forming a distinct class. It is to be inferred that this may be considered Order II under the Class Lycopodineæ (as in the *University Text-book*), but the author makes no statement on this point, and his rather detailed emphasis on the facts pointing to "a real, but extremely remote relationship between Isoetes and the Eusporangiatæ" may leave the student in doubt as to why this genus is generally connected with the Lycopods. There are many important additions to text and illustrations, particularly in such recently investigated forms as Botrychium, Selaginella, and Isoetes.

One of the new chapters, on "The Nature of the Alternation of Generations," champions the antithetic theory with the same general argument as that advanced by Professor Campbell in the *American Naturalist* in 1902; he considers that the advocates of the homologous theory have not furnished sufficient evidence to substantiate their view. Here as well as elsewhere, the author gives some prominence to Coleochæte as the probable ancestor of the bryophytes. The recent investigations of Allen on chromosome reduction in this genus indicate, to say the least, that it is much further removed from the bryophytes than has been supposed. We should be unwilling to say there is no alternation of generations in Coleochæte; but if the phenomena of reduction are to be made the chief means of interpretation, the sporophyte is undifferentiated, consisting only of the fertilized oöspore, while the first four cells produced in its germination, or possibly the mass of loosely connected cells, may bear a remote comparison to the spores of mosses. Certainly the view held by Campbell and others that the zoöspores produced by these cells are homologous with the moss spores was not rational; for that zoöspore production is only one method of germination of these cells, depending upon accidental conditions, is proved by the fact that they may grow out directly into filaments, as shown by Chodat and others.

The other new chapter furnishes a convenient but necessarily brief and incomplete *résumé* of the fossil Archegoniates. In the concluding chapter, the author holds mainly the same views as previously: he is inclined to believe that the Spermatophyta are polyphyletic in origin, since the Conifers show the greatest resemblance to the Lycopodineæ, and the Cycads to eusporangiate ferns (through the Cycadofilices); while the Monocotyledons may possibly be derived from aquatic ancestors resembling Isoetes, and the Dicotyledons from the Monocotyledon stock.

There are numerous paragraphs in the first edition where the language is obscure, and we have hoped in vain that these might be made more clear for the benefit of the student who can ill spare time to dig out their meaning. Nevertheless in spite of these and some other defects which might have been remedied without very great labor, it must be said that Professor Campbell has given us a much improved and more usable edition of a valuable book.

T. E. HAZEN

Common and Conspicuous Lichens of New England[1] is the title of a series of booklets by R. H. and M. A. Howe. The descriptions are accompanied by some very good photographic reproductions of the lichens in their habitats, as well as by line drawings of the thallus. The work is being issued in parts. Part I contains twenty-two pages; Part II, eighteen pages. The following genera are described in the first two parts — Ramalina, Cetraria, Evernia, Usnea, and Alectoria.

H. S. R.

Czapek's Biochemistry of Plants.[2] — Each year witnesses an increasing interest in the study of biological chemistry. As time goes on the work becomes broader and yields more results. Until recently the subject would have perhaps been more aptly designated as zoö-

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[1] Howe, R. H., Jr., and M. A. *Common and Conspicuous Lichens of New England; a Fieldbook for Beginners.* Boston, W. B. Clarke and Co., 1906. 16mo, Parts 1, 2, 40 pp. $1.00

[2] Czapek, F. *Biochemie der Pflanzen.* Jena, Bd. 1, 8vo, pp. xv + 584, 1904; Bd. 2, 8vo, pp. 1186, 1905.